

**APPENDIX B**

**TRI - REGIONAL BOARD STAFF**

**RECOMMENDATIONS**

**FOR PRELIMINARY INVESTIGATION AND**

**EVALUATION OF UNDERGROUND TANK SITES**



**NO FURTHER ACTION**

**REQUESTS**

**1 MARCH 1994**  
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**Prepared by Staff of the**

**Central Valley Regional Water Quality Control Board**

*State of California*  
**REGIONAL WATER QUALITY CONTROL BOARD**  
**CENTRAL VALLEY REGION**

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CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARD

**STAFF  
RECOMMENDATIONS  
FOR  
NO FURTHER ACTION REQUESTS**

The Central Valley Underground Tank Program (Program) is implemented to achieve the goals of State policies, regulations, and procedures adopted by the State Water Resources Control Board, the Porter-Cologne Water Quality Act (California Water Code) and the Regional Board's Basin Plans. To provide consistency in the Program, the Central Valley Regional Board staff developed the *Tri-Regional Board Staff Recommendations for Preliminary Investigation and Evaluation of Underground Tank Sites* and its Appendix A, which, both based on concepts originally developed in 1981, are revised periodically to accommodate statutory, regulation and policy changes. Appendix A prescribes minimum report contents which are to be submitted for review and approval. Appendix A streamlines the process for investigation and cleanup of sites to assure the discharger that the remediation system proposed is appropriate for the site subsurface conditions.

Appendix B for site *NO FURTHER ACTION REQUESTS*, is necessary to complete the documentation process before a request for no further action can be processed. The request must include signatures of registered individuals as required by the California Business and Professions Code. The purpose for a no further action report is to provide a document upon which the regulator may make an objective decision regarding the requested closure. The report and the Board's (or Local Implementing Agency) summary memo supporting the request will remain on file in the Regional Board office for public review.

This staff report also addresses the classification of "low risk" cases and the application of active or passive remediation measures at these sites. The applications and measures are discussed in the Lawrence Livermore National Laboratory Report: *Recommendations to Improve the Cleanup Process for California's Leaking Underground Fuel Tanks*, October 16, 1995, and the 8 December 1995 State Water Resources Control Board letter<sup>1</sup>, respectively.

If you have any questions regarding Appendix B, please call the Underground Tank Unit at (209) 445-5116 (Fresno), (916) 224-4845 (Redding), or (916) 255-3000 (Sacramento).

GORDON LEE BOGGS  
Underground Tank Program Manager

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<sup>1</sup> Letter from Walt Pettit, Executive Director, to all Regional Board Chairpersons and Executive Officers and all Local Oversight Agency (LOP) Directors, dated 8 December 1995.

## DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT INTRODUCTION

Central Valley Regional Board staff recognize that total cleanup of a site, although generally possible, is not always feasible or warranted ("site" includes on- and/or off-site problems resulting from the release of underground storage tank contents). Therefore, **no further action required at a site may be unconditional** if the site has been remediated successfully, or **with conditions** that "no further action is required at this time" when total cleanup can not be achieved. **Regardless of the action requested, an Appendix B report is required for Regional Board review.** The report is to document whether complete remediation of the site has been achieved, or that a "no further action" of a site is warranted and that some soil or ground water contaminants will remain.

The report must discuss the site history, existing conditions, and rationale why the site may no longer require remediation and contamination remain on- or off-site. The rationale must include a finding about future impacts on water quality and human health and safety. The supporting data and summary checklist (Table 1) is to be completed and submitted with the report by the Responsible Party(ies) or their designee. If it has been determined that only soil has been impacted, evidence substantiating the condition must be submitted.

### DETERMINING WHEN LUST SITES POSE A LOW RISK TO HEALTH, SAFETY AND THE ENVIRONMENT

The following recommendations are to be applied only to sites contaminated with petroleum hydrocarbon fuels, i.e., gasoline, diesel, fuel oil, aviation fuel mixtures and their additives.

For each case, **site characterization** is required to determine the extent of contamination, the risk to human health and the environment<sup>2</sup>, and the impact on existing and probable future beneficial uses of water resources. Site monitoring must show that the remedial measure(s) applied by the Discharger is reducing or removing the petroleum hydrocarbons at the rate and in the time schedule projected. The Discharger must demonstrate that the selected remedial measure(s) are effective.

### CASE EVALUATION

Each site is evaluated on a case-by-case basis to determine if it is a "low risk" case. Upon determining that the case meets the criteria for "low risk", a "no further action required" (NFAR) letter will be issued. Sites with a significant mass of petroleum hydrocarbons left in place are not precluded from consideration of low risk. A case may be a low risk site by definition or, by active or passive remediation, achieve a low risk status.

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<sup>2</sup> "Environment" includes the unsaturated or vadose zone, and surface water and ground water.

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Cases may qualify as "low risk" when the lead agency finds that:

1. accurate documentation provided shows the criteria below for Vadose Zone or Ground Water cases have been met;
2. remediation and monitoring verify the criteria will be achieved; and,
3. State and local standards for monitoring well closure have been met and verified.

**FOUNDATION DOCUMENTS**

Foundation documents for defining site problems and appropriate responses include: State Board Policy No. 92-49: *Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*, as amended; The Water Quality Control Plans (Basin Plans) for the California Regional Water Quality Control Board, Central Valley Region; Title 23, Division 3, Chapter 16 Article 11 of California Code of Regulations, Underground Storage Tank Regulations; and Title 23, Division 3, Chapter 15, Sections 2511(d) and 2550.4 of the California Code of Regulations, Discharges of Waste to Land Regulations.

These documents and the following recommendations are not new, but rather, protocol and procedures that have been available to a tank owner or operator since inception of the Central Valley Regional Board LUST program.

**VADOSE ZONE CASES**

"Vadose zone" cases are those where fuel hydrocarbons or additives have not reached, and will not reach, the ground water or capillary fringe.

**CRITERIA FOR LOW RISK VADOSE ZONE DESIGNATION**

All the following must be demonstrated in order to designate a case as a "low risk":

1. **Demonstrate that only the vadose zone has been affected.**

See the Tri-Regional Recommendations, Page nine, Figure 1 and Tables 1 & 2, and Appendix A to the Tri-Regional Recommendations.

At some sites, natural biodegradation may be occurring at rates sufficient to provide a rationale for not actively remediating the site or for reducing the degree of active remediation. The Discharger must provide technical documentation for the passive measure and project a time schedule for the remediation to clean up the vadose

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zone soil and/or ground water to acceptable levels. Monitoring must demonstrate that natural biodegradation is occurring at a rate sufficient to protect human health and the environment, after source abatement has been accomplished, and the vadose zone soil and/or ground water will not be used or needed in the projected time schedule.

2. **The release or leak has been stopped and source(s) of hydrocarbons in the vadose zone have been removed or permanently contained.**

"Source(s)" includes non-aqueous phase liquids and any petroleum hydrocarbons and additives in the vadose zone which may be mobile (or could be mobilized) under natural conditions, during construction, or other physical disturbance of the site. The source must be removed and/or contained, to the extent practicable, to prevent further spread of pollutants.

3. **Petroleum hydrocarbons remaining in the vadose zone (or surface soils) do not impact or threaten waters of the State.**

For any mobile constituents remaining in the vadose zone, the rate of potential pollutant migration, fluctuating ground water levels and the depth of pollutants in the vadose zone must be determined. Using fate and transport modeling, leachability studies, or other verification tools, information must be provided to show that there is no impact or threat to surface or ground water quality. Erosion and surface runoff, which may impact surface waters, are prohibited.

4. **No significant risk to human health and safety exists or is anticipated following remediation.**

Risk includes direct physical contact, entry to basements, homes or office buildings and subsurface utilities.

#### MANAGEMENT STRATEGY

A NFAR letter may be issued when the vadose zone only site conforms to all the above criteria. Changes in land use may require reevaluation of the site conditions and additional remediation measures may be appropriate. The upper soils should be remediated, as appropriate, for current and anticipated land use(s). Documentation of results must be provided in accordance with Appendix B to the Tri-Regional Recommendations.

## **DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT DRAFT GROUND WATER CASES**

Central Valley aquifers are unique because they constitute the State's largest aquifer with about 75% of the available water storage in California. Additionally, much of the Central Valley's surface waters are exported for use in Southern California and the San Francisco Bay area, leaving ground waters to provide the majority of Central Valley municipal and domestic use. Considering California's historic growth and growth projections, it is apparent that water demands already exceed the surface water supplies.

Ground water cases are those where petroleum hydrocarbons have reached the ground water or capillary fringe, and include the pollutants in the vadose zone. Water found in tank pits during "tank pulls" may result from local storm events and, so, must be sampled, analyzed and pumped out. If water seeps into the pit after pumping, it is ground water.

### **CRITERIA FOR LOW RISK GROUND WATER DESIGNATION**

All the following criteria must be met:

- 1. Contaminants remaining in the vadose zone must not reverse or threaten to reverse the mass reduction rate of ground water pollutants discussed in #4 below.**

Aquifer water levels may rise in response to rainfall events and, thereby, be impacted by the hydrocarbon contaminants remaining in the vadose zone. Information must be supplied to show that this will not reverse the mass reduction rate.

- 2. Separate phase product has been removed to the extent practicable.**

See Title 23, CCR, Section 2655, Article 5 of the Underground Storage Tank Regulations which requires removal of "free product to the maximum extent practicable" to minimize "the spread of contamination into previously uncontaminated zones."

- 3. No existing water supply wells, deeper aquifers, surface waters or other receptors are threatened by pollutants remaining in the aquifer.**

Water supply wells include municipal, local service or private wells, agricultural and industrial wells. Central Valley aquifers generally are not segregated into discrete units, but are subject to vertical and horizontal migration of water and any pollutants carried by or in the water, often by local pumping. Other receptors include basements, buildings, subsurface utilities, wildlife, etc.

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At times, petroleum hydrocarbon discharges to surface waters occur from nearby ground water seeps or fuel saturated soils. Such discharges are prohibited and must be stopped and prevented from recurring. Until the discharge to surface water is stopped, the site will not be considered for "low risk" designation.

4. **The total pollutant mass remaining in the ground water is decreasing at predicted rates and neither creates, nor threatens to create, a risk to human health and safety or future beneficial use(s) of the aquifer.**

Fate and transport modeling, (including breakdown rates and travel distances, risk based corrective action data and tests, and petroleum hydrocarbon breakdown products resulting from active or passive remediation), may be included in the rationale for determining that the case is "low risk". The rates predicted must be verified with sufficient monitoring.

### MANAGEMENT STRATEGY

The existing and potential impact of leaving pollutants in aquifers designated for *Municipal* beneficial uses must be determined by completing a site characterization, remediation and monitoring program. The determination must demonstrate to the lead agency that, at a minimum, by the time the ground water is anticipated to be used, water quality objectives will be achieved and beneficial uses will be protected. The Responsible Party must provide sufficient evidence and rationale to show that the remaining petroleum hydrocarbons may be left in place and are in compliance with applicable statutes, regulations, plans and policies. Documentation of results must be provided in accordance with Appendix B to the Tri-Regional Recommendations. A NFAR letter be issued only when the above work has been completed and site characteristics are shown to meet or exceed the above criteria.

With few exceptions, all waters of the Central Valley are designated in the Basin Plans for the highest uses requiring protection and remediation; i.e. municipal and domestic supply. For these reasons it is imperative that pollution sites be adequately characterized and remediated as appropriate to protect ground water for its designated beneficial uses. From a water quality perspective, the main goal of remediation is the restoration of the beneficial uses of the water within a reasonable period of time, i.e., by the time the water has the probability of being used. To restore beneficial uses, cleanup must at least achieve water quality objectives (limits prescribed in the Central Valley Regional Water Quality Control Plans for the reasonable protection of beneficial uses).

Staff considers economic and technical feasibility constraints for remediation alternatives for protecting waters for their existing and future beneficial uses. Therefore, it is necessary to determine when petroleum hydrocarbons in the environment can be considered or achieve a "low risk" status to remain in place



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while natural processes reduce the adverse impacts in ground water. In considering whether the time anticipated for passive bioremediation is reasonable, several factors may affect the determination. These factors include a comparison to the time anticipated for active remediation, existing use of the ground water and the time for probable use of the aquifer. Thus, if existing or near-term uses of the ground water are impaired, passive bioremediation might not be appropriate. On the other hand, if currently-used waters are not affected, and the pollutants are not expected to migrate to waters that will be used before the remediation is effective, then passive bioremediation may be appropriate. Using either passive or active remediation measures, the end result should be the same: i.e., protection of beneficial uses and achieving compliance with water quality objectives.

All proposals for remediation, whether active or passive, require support by technical reports with rationale demonstrating that the remediation proposed is appropriate and will achieve compliance with the water quality objectives within a reasonable time period. If existing or near-term uses are impaired, more rapid cleanup should be required. If the pollution does not affect currently used aquifers and is not expected to migrate to waters that are currently used, or used the the near future, then cleanup to water quality objectives could be allowed to occur over a longer time frame. In cases where it has been determined that a longer time is appropriate, passive cleanup measures may be considered. Passive cleanup measures do not require a change in the ultimate goal of cleanup—restoration of beneficial uses by reducing pollutants to levels that are lower than applicable water quality objectives. Passive measures are risk based. Risks to beneficial uses drive both cleanup levels and time schedules for cleanup.

## **NO FURTHER ACTION REQUIRED DOCUMENTATION**

The minimum information required in the report is included in Table 1. Submit the data and check-off Table 1 with "yes", "no" or "NA" (not applicable), as appropriate.

Additional information submitted, such as risk assessments or fate and transport modeling, must include the assumptions used.

Upon review, when Board staff determines that the No Further Action Required Report substantiates the request, remedial and monitoring activities may cease. At that time, Board staff will prepare a memo summarizing the remediated site conditions and a No Further Action Required letter issued by the Executive Officer of this Board (or Local Implementing Agency or Local Oversight Program county with concurrence by Regional Board staff).

When soil and ground water pollution remains on site, nothing in the no further action required determination shall constitute or be construed as a satisfaction or

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release from liability for any conditions or claims arising as a result of past, current, or future operations at the location. Nothing in the determination is intended or shall be construed to limit the rights of any parties with respect to claims arising out of or relating to deposit or disposal at any other location of substances removed from the site. Nothing in the determination is intended or shall be construed to limit or preclude the Board or any other agency from taking any further enforcement actions.

The letter does not relieve the tank owner of any responsibilities mandated under the California Health and Safety Code and California Water Code if existing, additional, or previously unidentified contamination at the site causes or threatens to cause pollution or nuisance or is found to pose a threat to public health or water quality. Changes in land use may require further assessment and mitigation.

**TABLE 1 - CHECKLIST OF REQUIRED DATA  
FOR NO FURTHER ACTION REQUESTS AT UNDERGROUND TANK SITES**

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Site Name and Location: \_\_\_\_\_

- ☐ Distance to production wells for municipal, domestic, agriculture, industry and other uses within 2000 feet of the site;
- 2. ☐ Site maps, to scale, of area impacted showing locations of former and existing tank systems, excavation contours and sample locations, boring and monitoring well elevation contours, gradients, and nearby surface waters, buildings, streets, and subsurface utilities;
- 3. ☐ Figures depicting lithology (cross section), treatment system diagrams;
- 4. ☐ Stockpiled soil remaining on-site or off-site disposal (quantity);
- 5. ☐ Monitoring wells remaining on-site, fate;
- 6. ☐ Tabulated results of all groundwater elevations and depths to water;
- 7. ☐ Tabulated results of all sampling and analyses:
  - ☐ Detection limits for confirmation sampling
  - ☐ Lead analyses
- 8. ☐ Concentration contours of contaminants found and those remaining in soil and groundwater, both on-site and off-site:
  - ☐ Lateral extent of soil contamination
  - ☐ Vertical extent of soil contamination
  - ☐ Lateral extent of groundwater contamination
  - ☐ Vertical extent of groundwater contamination
- 9. ☐ Zone of influence calculated and assumptions used for subsurface remediation system and the zone of capture attained for the soil and groundwater remediation system;
- 10. ☐ Reports / information
  - ☐ Unauthorized Release Form (URF)
  - ☐ QMRs (Dates) \_\_\_\_\_
  - ☐ PAR
  - ☐ FRP
  - ☐ Other (report name) \_\_\_\_\_
  - ☐ Well and boring logs
- 11. ☐ Best Available Technology (BAT) used or an explanation for not using BAT;
- 12. ☐ Reasons why "background" was/is unattainable using BAT;
- 13. ☐ Mass balance calculation of substance treated versus that remaining;
- 14. ☐ Assumptions, parameters, calculations and model used in risk assessments, and fate and transport modeling;
- 15. ☐ Rationale why conditions remaining at site will not adversely impact water quality, health, or other beneficial uses; and
- 16. ☐ WET or TCLP results

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

By:

Date:

TABLE II-2

## GROUND WATER BODIES AND BENEFICIAL USES

	MUNICIPAL AND DOMESTIC	IRRIGATION	STOCK WATERING	PROCESS	SERVICE SUPPLY
1. GOOSE LAKE VALLEY	•	•	•		
2. ALTURAS BASIN	•	•	•		
3. BIG VALLEY	•	•	•		
4. FALL RIVER VALLEY	•	•	•		
5. REDDING BASIN	•	•	•	•	
6. LAKE ALMANOR VALLEY	•	•			
7. INDIAN VALLEY	•	•			
8. AMERICAN VALLEY	•	•	•		
9. MOHAWK VALLEY	•	•	•		
10. SIERRA VALLEY	•	•	•		
11. UPPER LAKE VALLEY	•	•	•		
12. SCOTT VALLEY	•	•	•		
13. KELSEYVILLE VALLEY	•	•	•	•	
14. LONG VALLEY	•	•	•		
15. HIGH VALLEY	•	•	•		
16. BURNS VALLEY	•	•	•		
17. LOWER LAKE VALLEY	•	•	•		
18. COYOTE VALLEY	•	•	•		
19. COLLAYDMI VALLEY	•	•	•		
20. EAST TEHAMA CO. & NW CORNER OF BUTTE CO.	•	•	•		
21. TEHAMA CO. WEST OF SACRAMENTO RIVER	•	•	•		
22. NORTH BUTTE CO.	•	•	•		
23. GLENN CO.	•	•	•		
24. SOUTH BUTTE CO.	•	•	•		
25. COLUSA CO. & NORTH YOLO CO.	•	•	•		
26. SOUTH YOLO CO.	•	•	•	•	
27. CAPAY VALLEY	•	•	•		
28. SOLANO CO.	•	•	•	•	
29. PLACER CO. & YUBA CO.	•	•	•	•	
30. SUTTER CO.	•	•	•		
31. SACRAMENTO CO.	•	•	•	•	•
32. SAN JOAQUIN CO.	•	•	•	•	•
33. CONTRA COSTA CO.	•	•	•	•	•
34. "	•	•	•	•	•
35. I & G	•	•	•		
36. F	•	•	•	•	
37. E	•	•	•	•	
38. D	•	•	•		
39. A & B	•	•	•	•	•
40. C	•	•	•	•	

\*RECENT DWR DESIGNATION OF GROUNDWATER BODIES IN SAN JOAQUIN BASIN (31-37)

FIGURE 11-2

GROUNDWATER BODIES AND BENEFICIAL USES

